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ABSTRACT

Since the questioning process is critical in stimulating student learning, an urgent need for more extensive, controlled research on this topic exists. Previous studies indicate that a high percentage of questions asked by teachers call only for factual answers and that oral activity in the classroom is largely teacher-dominated. Further, no studies have attempted to ascertain the extent to which teachers transfer and use their own questioning skills in the classroom. Several factors contribute to the discrepancy between what teachers have been taught regarding questioning and what they actually practice in the classroom. These factors are: (1) numerous and inconsistent question classification systems confuse teachers, (2) research methodologies of even the most significant studies are questionable, and (3) the limited perception of the questioning process does not concern itself with student-posed questions. Current research studies examine the effectiveness of teachers trained in questioning techniques as opposed to untrained teachers, the relationship between the cognitive level of a teacher's question and the cognitive level of the student's response, the relationship between high- and low-level questions and different types of stimuli, and the relationship between questioning and problem solving in preschool children. Future research should be oriented toward fitting different types of questions to established strategies, determining the connection between different types of instructional media and levels of questioning, and identifying the effects of different types of questioning strategies in teacher-training situations. (KC)

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QUESTIONING AND ITS IMPLICATIONS FOR EDUCATIONAL RESEARCH

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Over the past fifteen years there has been a growing concern over thinking as a prime objective in social studies curricula. Despite uncertainty, and at time even controversy, over what constitutes thinking (and its associated processes), it has largely become a major component of the rubric of 'new' Social Studies. Most agreement about thinking has centred on the view that it is a process which can be taught and that the act of teaching may well be one of the most influential factors in its development. While teaching is composed of numerous plans, strategies and moves, questioning has been described as "by far the most influential teaching act" (Taba et.al., 1964) in developing thinking. Other writers have viewed questioning as exerting an even more potent influence on learning in that not only does it stimulate student responses but once having understood the processes to use and the questions to ask, students learn to apply questioning to both similar and new situations (Carner, 1963; Hunkins, 1972).

While such claims undoubtedly place a heavy responsibility on social studies teachers, it would seem that a number of premature assumptions have been made about questioning. If questioning is such a fundamental process (as the research suggests) then the classroom teacher must be a "skilled questioner" (Hunkins, 1970) as well as "a professional question maker" (Aschner, 1961). However the evidence from earlier studies on the types of questions asked, the dominance of teacher verbalism and rate of questioning does raise serious doubts as to the ability of most teachers to adjust their questioning habits. In their review of the literature in this area, Hoetker and Ahlbrand (1969) concluded that over the last fifty years

> "the dominant mode of thinking stimulated by teacher questions is at the level of memorization and recall of facts, and not higher thought processes such as analysis and synthesis" (p. 166).

Such a conclusion was the outcome of the numerous research studies which have explored questioning behaviours of teachers at the elementary level (Hayes, 1935; Corey, 1940; Floyd, 1960; Schreiber, 1967), the

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secondary level (Stevens, 1912; Adams, 1964; Gallagher, 1965) and the trainee-teacher level (Davis and Tinsley, 1967; Rogers, 1969).

At the elementary school level, Haynes (1935) found that 77% of all questions in Grade VI History called for factual answers. Other studies at this level tend to support this finding of concentration on factual answers (Corey claimed that 71% of questions fall into this category; Floyd found that only 5% of questions were capable of stimulating thought, and Schreiber concluded that 81% of questions required memory of facts).

The position at the secondary school appears to be no more promising. Stevens (1912) found in her study that 80% of the school time was spent in question and answer, and on an average, the teachers under study asked 395 questions per day. Gallagher (1965, p. 568) concluded that

> "cognitive-memory was the most dominant thought process for both teachers and pupils in Social Studies".

The complete cycle to this dilemma tends to be perpetuated at the trainee-teaching level. Davis and Tinsley (1967, p.21) found that in their analysis of classroom questions,

> "student teachers and pupils asked more memory (questions) than all other categories combined."

It is equally apparent that in the past teachers have dominated the oral activity in classrooms. Floyd (1960) estimated that 70% of all oral expression and 93% of all questions were teacher initiated. Herman (1967, 1969) found that teachers tended to dominate discussion and activities from 40% to 70% of the time. Such a situation is even more critical when one considers the rate of questioning and the length of time given for responses to be made. Schreiber (1967) found that in fourteen grave V classes, teachers asked on the average 64 questions in a thirty minute social science lesson. Hoetker (1968) concluded that teachers ask questions even more often than this by concluding that teachers in English classes in 'better schools' asked a question every 11.8 seconds compared to every 10.7 seconds in low-ability 9th Grade classes. Rowe (1969, p.11) discovered that

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> "teachers ... allow an average of one second for a child to start an answer. After a child makes a response, teachers ... are still in a hurry because ... (they) generally wait slightly less than a second to repeat what he (the child) said or to re-phrase it or ask another question."

There is also further evidence to suggest that low ability children are given even less time to respond than children of higher ability (Brophy & Good, 1970).

A second major assumption which has been made about questioning is that once having become skilled in questioning, teachers transfer this behaviour to the classroom setting. Although numerous studies have demonstrated (in varying degrees) that teacher-questioning skills can be taught (Educational Research and Development - Borg, Kelley, Langer & Gall, 1970; Shaver & Oliver, 1964; Suchman, 1958; Taba, 1966; Galloway & Mickelson, 1973), to the author's knowledge no studies have attempted to ascertain the extent to which these skills, once having been learned under specific training conditions, are transferred and used in the same subject area, in other subject areas or the classroom in general. Rather there has been the suggestion made that

> "... teachers trained in the taxonomy of questions often fail to implement the question skills in their classroom in a pervasive and continuous way ... not that they reject the merit of asking a variety of questions; rather, they find it difficult to put into practice" (Sanders, 1972; p. 268).

What then has caused this discrepancy between what teachers espouse (and, at times have been trained in) and what they practice?

Factors Encouraging Discrepant Questioning Behaviour

Some writers have argued that teachers and curriculum builders have been preoccupied with an almost ritualistic adherence to the formulation of currently acceptable objective statements, but which, once having been formulated, bear little resemblance to the content and processes used (Parsons and Shaftel, 1967). The use of different types of questions and questioning techniques would seem to be a prime example of this discrepancy between advocacy and practice and can be explained in a number of ways.

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Firstly, the area of questioning has been subject to considerable taxonomic building. In 1971, Hillman reported that "no fewer than 14 classification systems have been proposed" (p.7) and this has been added to over the past five years. Question classification systems have been proposed by Bloom (1956), Carner (1963), Taba et.al., (1964), Kleinmen (1965), Gallagher (1965), Suchman (1966), Schreiber (1967), Schrable & Minnis (1969), Manson (1970), Orme (1970), Lynch & Ames (1971), and Fraenkel (1973). Undoubtedly the initial taxonomy has been most widely used as the basis of other research (Sanders, 1966; Davis & Tinsley, 1967; Hunkins, 1968; Clegg, 1969; Tyler, 1972; Buggey, 1972). However, it is not the array of classification systems which have necessarily created confusion about questioning; rather, the problem is more that the same terms have been used differently in several taxonomies. Not only is it likely that many teachers are uncertain as to which question types to use (since similar terms often refer to different things) but that it is then difficult to generalize about the effects of questions on achievement. Hillman (1971, p. 4) recognized this when he stated that

> "often these categories, while having the same name will not in fact describe the same set of teacher behaviours so that, operationally speaking, the terms do not mean the same thing. As a result, it becomes difficult to draw general conclusions from the different studies, for they are not dealing with the same phenomena."

Another related problem involves identifying studies that have produced changes in student thinking, and perhaps even more importantly, factors that have been responsible for these changes. Some of the more significant studies include those by Taba, Levine & Elzey (1964), Taba (1966), Hunkins (1967, 1968), Tyler (1971), Buggey (1972), Cole & Williams (1973), Smith (1974), Turner (1974), Denney & Connors (1974), and Simmons (1976).

Taba et. al. (1964) found that teachers trained in their questioning strategy were successful in getting the results they sought, namely higher levels of thinking; that the students whose teachers had been trained in the processes of the three cognitive tasks were superior to untrained teachers' students in the ability to discriminate, infer from data and apply known principles; and, finally, that teaching strategies designed to foster cognitive skill make a difference to the productivity of thought.

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Although Hunkins (1968) did not tie different types of questions to certain cognitive tasks, he found that sixth grade children exhibited higher levels of social studies achievement when taught with materials using predominately higher level questions (analysis and evaluation) of the Bloom Taxonomy (Handbook 1 : Cognitive Domain) as compared to those students who were exposed to mainly knowledge questions. The two later studies of Tyler (1971) and Buggey (1972) attempted to remedy some of the control and validity problems of the Hunkins research. Tyler studied the relationship between children instructed with non-reading materials (Grade II level) using 30% knowledge level questions and 70% higher level questions, as compared to those using the same percentages who were instructed with reading materials. Both in turn were then compared to a control group. She found that

> "children instructed with predominately higher level performed at significantly higher levels regardless of the method of question presentation, than did children receiving regular classroom instruction. However, children using non-reading materials for question presentation achieved at significantly higher levels than did children using reading materials for question presentation" (p.4).

A parallel study which used the same content (the concepts of location and rules) and grade level confirmed this result (Buggey, 1972). In this latter study, Buggey investigated the effects of instruction using 30% knowledge and 70% higher level questions as compared to instruction which used 70% knowledge and 30% higher level questions. The initial treatment was found to yield greater Social Studies achievement.

The Cole & Williams study (1973) monitored tapes of portions of social studies, science and health lessons of eight different teachers (Grades 2-6) in an attempt to see the relationship between the cognitive level of the teacher's questions and the cognitive level, length of response and syntax of pupil response. They also studied the relationship between the cognitive level of pupil responses and the length and syntax of these responses. In both instances they found that there was a positive relationship - namely, that

> "the cognitive level, length and syntax of pupil responses are highly contingent upon the cognitive

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> level of the teacher's questions. Furthermore, there is a significant association between the cognitive level of pupil responses and the length and syntax of these responses" (p. 144)

Three recent studies have investigated questioning in the context of a third variable - a visual stimulus (Smith, 1974; Simmons, 1976) or particular learning situation (Turner, 1974).

Smith (1974) studied the relationship between two types of questions (factual and interpretative) and three types of stimuli (a picture, a listening stimulus and a reading stimulus) on the oral language production of Grade 2 and Grade 4 children. Her finding was that not only were there longer average communication units for interprative questions, but that the answers to the interpretative questions were significantly longer for the listening stimulus than the picture stimulus for both grades. However, the length of communication in answering interpretative questions about the listening stimulus was not significantly longer than for the reading stimulus among the Grade 2 children. Simmons (1976) analyzed the linguistic responses of disadvantaged kindergarten children subjected to three different types of questions (data recall, data processing and application) in relation to a common set of five slides. Her conclusion was that verbal responses were 'higher' (on the three measures used) for both the data processing and the application questions.

Turner (1974) found that where Nursery school children are exposed to five week sequences of low level cognitive questions, high level cognitive questions, low level cognitive questions, that this led to at least temporary gains in scores on certain problem solving measures in young children.

Finally one of the few attempts to alter the questions which students pose was undertaken by Denney & Connors (1974). They found that pre-school children who initially asked no constraint-seeking questions and who were exposed to either exemplary modelling or strategy modelling that both were effective

> "in facilitating both the use of constraint-seeking questions and problem solving efficiency when the stimulus category is identical to the one used in training; however, when a new stimulus category is employed, strategy modelling seems to be more

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> effective than exemplary modelling in facilitating both the use of constraint-seeking questions and problem solving efficiency" (p. 1111).

Although these studies do provide evidence that higher levels of questioning lead to higher levels of achievement and responses (which may not be synonymous with thinking), even these must be treated with a degree of caution. Not only is it possible to provide studies which suggest that higher levels of thinking do not produce greater student achievement (Wright & Nuthall, 1970; Bedwell, 1975) but in those studies (above) where significant differences did occur one can question the research methodologies which at times have been used. Examples of this can be seen in instances where only partial criteria from the original taxonomy has been used (Hunkins; Tyler; Buggey), where the post-testing measures are questionable (Torrance, 1972; Taba, 1966; Hunkins, 1968), and where the study has failed to control the content of lessons (Turner, 1974; Cole & Williams, 1973). It is equally apparent that there has also been little consideration given in past studies to keeping constant the number of questions per treatment group, the effects of 'wait' time and questioning patterns (the Taba studies being somewhat of an exception to this latter criticism).

A third major factor which appears to have seriously detracted from questioning techniques being more widely used stems from what has been a limited perception of the questioning process - particularly in inquiry-oriented programs. The development of thinking through the use of questions would seem to involve more than merely responding to questions. The almost exclusive research concentration on questions while teachers pose (and in particular higher order questions) may well have produced higher order responses which take on a situational meaning, rather than necessarily higher order thinking being the outcome. David Ausubel (1968) has explained this when he states :

> "pupils may develop a rote learning set if they are under excessive pressure to exhibit glibness, or to conceal, rather than admit and gradually remedy, original lack of genuine understanding. Under these circumstances, it seems easier and more important to create a spurious impression of facile comprehension by rote memorizing a few key terms or sentences, than try to understand what they mean. Teachers frequently forget that pupils become

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> very adept at using abstract terms with apparent appropriateness - which they have to - even though their understanding of the underlying concept is virtually non-existant." (p. 37)

Such a state of affairs is largely due to the types of question-classification systems which have been used to date. These systems are largely composed of categories based on the type of cognitive process required to answer questions. Since these processes are inferential constructs and cannot be "observed", there is always the question raised as to whether or not the student has used a high or low level process in solving a particular problem.

The development of thinking through problem solving should also be concerned with the questions which students pose - particularly if independent thinking is a desirable outcome of Social Studies. Yet the literature on questioning reflects very limited concern for student questions (Piaget, 1926; Davis, 1932; Smith, 1933; Wellington & Wellington, 1962; Carner, 1963), strategies designed to enhance student questioning (Suchman, 1966; Bereiter, 1968) and research into ways of modifying student questions (Mosher & Hornsby, 1967; Laughlin et. al., 1969; Denney, 1972; Denney et. al., 1973; Denney & Connors, 1974). These studies are basically concentrated into two broad areas - questions children pose outside elementary and secondary school and research studies aimed at altering questioning through modelling approaches. It would seem that teachers and researchers have largely assumed that they know the questions students ask or alternatively have ignored the issue while continuing the platitude that 'new' Social Studies involves both processes.

Finally it has been argued that the limited use of questioning techniques may well be due to what Sanders (1972, p. 268) has termed "more wrong answers to higher level questions". While there is the possibility that this could occur, such a claim seems exaggerated in that this discrepancy is only truly observable where behavioural objectives have been specified. Unless such objectives have been specified it would seem impossible to determine if in fact this discrepancy did exist. Failing this teachers will undoubtedly judge responses on their factual correctness - and thus perpetuate what

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generally still appears to be a commitment to the recall of factual content.

Implications for Future Research

It would now seem opportune for researchers interested in questioning to progress beyond the previous concern for the number and types of questions teachers ask and studies which look at the effects of cerain categories of teacher questions on pupil behaviour - particularly where there has been a concentration on linguistic analyses of outcomes. What is largely needed now is the development of a number of complementary measures which will be supportive of this type of evaluation. It would further seem appropriate that researchers in this field could direct their efforts into three particular areas. Firstly, it would seem that far more research could be oriented towards establishing particular strategies in social studies, and, once these having been established, fitting different types of questions which are more appropriate to each phase of the strategy. Clegg (1971) identified this when he stated:

> "category systems such as those described are useful for developing explanatory theories and for indicating the relatively low cognitive level of classroom operation. But to be of further use, prescriptive strategies must be developed (such as Taba has done), complete with eliciting questions which are designed to produce certain desired types of responses from students. Such theoretical strategies must then be validated by field testing to develop sufficient empirical evidence to support them otherwise, the untested theory degenerates to the present condition of hortative advice accompanied by little more than static, normative data."

Secondly, little attempt has been made to determine the connection (if any) between different types of media and levels of questioning. One basic supposition which has been overlooked in the past is that in many instances children inquire, form concepts and are capable of generalizing regardless of the question asked or indeed any question having been formally posed. In these instances, the ability to acquire these skills may largely be determined by the stimuli than, as Hunkins (1972) suggests, through the functional level of the question. If the critical influences of both could be determined, the notion of inquiry would be further clarified.

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Thirdly, once researchers have determined the types of questions students ask, further consideration should be given to different modelling patterns in the context of social studies. Further investigation into this process may well provide the necessary connection between teacher and student questioning patterns.

At the same time, research into questioning should attempt to explore those areas of neglect and design weaknesses evident in earlier studies. Although several taxonomies do include affective categories (Hunkins, 1976; Olmo, 1972; Davis & Tinsley, 1967; Fraenkel, 1973), the contents of these categories generally lack the inclusiveness of those included in Bloom's cognitive domain and from the research point of view have largely been ignored.

Little also seem to have been done with the "follow-up" question as few of the classification systems are concerned with question sequences. Two exceptions to this have been the strategies devised by Shaver & Oliver (1964) with what they describe as a 'Socratic' question sequence, and the 'Probing-Skills' sequence used by Orme (1970). It may well be the case that Gall (1970) was correct when he hypothesized that

> "follow-up questioning of students initial response has substantial impact on student learning in classroom teaching situations" (p.712).

This notion would at least seem worthy of further consideration, particularly as it affects classroom interaction.

The area of teacher-training would still appear to be an area where further research could be undertaken. To date there has been little attempt to determine which methods are most efficient in developing questioning and sequencing skills, nor has there been attempts to determine the extent of training in questioning in trainee-teacher programs and where this is the case, determination of the effects of this training on classroom behaviour.

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SUMMARY

From a review of the literature on questioning this paper suggests an urgent need for more extensive, controlled research into this topic. In particular four main areas of concern have been expressed. Firstly, future research studies into questioning must attempt to place greater control on the variables under consideration as well as taking into account those which in the past have not been widely considered. This includes taking into account such things as the effects of 'wait-time', keeping constant the number of question posed per treatment group(s), controlling the content area in which questions are posed for a number of groups and finally some control over the pattern of questioning being taken. Secondly, further consideration should be given to the context in which questions are posed - whether this be in terms of a particular strategy, a set of behavioural objectives, different types of media (like pictures, cartoons, or non-commentary films) or particular types of classroom lessons. Thirdly the extent and effects of different types of questioning strategies in teacher-training situations seems worthy of further consideration. Finally it would seem imperative that the major omission of determining the questions children pose at different developmental levels should be remedied. Until this is undertaken such notions as cognitive mapping, modelling and inquiry will remain teacher-determined and teacher-dominated processes.

Questioning is basically the major determining process of classroom verbal interaction. Until such time that research also views questioning as a two-way process, instruction in all subject fields will remain primarily a one-sided affair.

(Note - A fully documented bibliography is available on request from the author.)

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